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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/611,857	07/03/2003	Masatoshi Taya	67161-045	3872

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600 13th Street, N.W.
Washington, DC 20005-3096

EXAMINER

SOWARD, IDA M

ART UNIT	PAPER NUMBER
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2822

DATE MAILED: 12/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/611,857

Applicant(s)

TAYA, MASATOSHI

Examiner

Ida M Soward

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,5,6 and 8-12 is/are rejected.
- 7) ☒ Claim(s) 2-5 and 7-12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>7-3-03</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office Action is in response to the application filed July 3, 2003.

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

The spacing of the lines of the specification is such as to make reading and entry of amendments difficult. New application papers with lines double spaced on good quality paper are required.

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Objections

Claim 4 is objected to because of the following informalities: “**portion**” should have been **region** on page 21, line 15. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 5 recites the limitation “**the first channel region**” and “**the second channel region**” in lines 4, 6-7 and 12-13.

Claim 8 recites the limitation “**the first channel region**” and “**the second channel region**” in lines 4, 6-7 and 12-13.

There is insufficient antecedent basis for this limitation in the claim..

Claims 9-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The wording of lines 19-20 of claim 9 does not describe the claimed structure clearly. For example, is a portion in the second impurity region or is it a portion of the second impurity region? Also, the statement does not make apparent what is made narrower.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishizawa et al. (5,654,560) in view of Esquivel (4,698,900).

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In regard to claim 1, Nishizawa et al. teach a semiconductor device, comprising: a first impurity region 2 of a first conductivity type formed on a main surface of a semiconductor substrate 1;

a first isolating insulation film 82 formed on a surface of the first impurity region 2;

a second impurity region 32 of a second conductivity type formed at that portion of the first impurity region which is positioned immediately below the first isolating insulation film 82;

a third impurity region 41 of the second conductivity type formed at a surface of a portion of the first impurity region 2, spaced apart from the first isolating insulation film 82;

a fourth impurity region 42 of the second conductivity type formed on a portion of the first impurity region 2 on a side opposite to the third impurity region 41 with the first isolating insulation film 82 positioned therebetween, spaced apart from the first isolating insulation film 82;

a right portion of electrode 7 formed on that portion of the first impurity region 2 which is sandwiched between the second impurity region 32 and the third impurity region 41;

and a left portion of electrode portion 7 formed on that portion of the first impurity region 2 which is sandwiched between the second impurity region 32 and the fourth impurity region 42 (Figure 1, column 4, lines 1-52).

In regard to claim 6, Nishizawa et al. teach the second impurity region 32, the third impurity region 41 and the fourth impurity region 42 each formed as wells (Figure 1, column 4, lines 1-52).

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However, Nishizawa et al. fail to a first electrode portion sandwiched between a second impurity region and a third impurity region and a second electrode portion sandwiched between a second impurity region and a fourth impurity region.

Esquivel teaches a first electrode portion 18 (right) sandwiched between a second impurity region 14 (center) and a third impurity region 14 (right) and a second electrode portion 18 (left) sandwiched between a second impurity region 14 (center) and a fourth impurity region 14 (left) (Figure 1, columns 6, lines 1-68).

To reiterate, Nishizawa et al. disclose the claimed invention except for a first electrode portion sandwiched between a second impurity region and a third impurity region and a second electrode portion sandwiched between a second impurity region and a fourth impurity region. Esquivel teaches that it is known to have a first electrode sandwiched between a second impurity region and a third impurity region and a second electrode portion sandwiched between a second impurity region and a fourth impurity region.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor structure as taught by Nishizawa et al. with the semiconductor structure having a first electrode sandwiched between a second impurity region and a third impurity region and a second electrode portion sandwiched between a second impurity region and a fourth impurity region as taught by Esquivel to significantly reduce the fringing capacitance at the lower corners of the electrodes (column 2, lines 44-60).

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Allowable Subject Matter

Claims 2-4 and 7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record does not disclose, make obvious, or otherwise suggest the structure of the applicant's together with the other limitations of the independent claims, in particular a second concentration region having an impurity concentration higher than the first concentration region, electrically connected to the first concentration region and formed in a direction away from the first isolating insulation film with respect to the second isolating insulation film; and a fourth concentration region having an impurity concentration higher than the third concentration region, electrically connected to the third concentration region and formed in a direction away from the first isolating insulation film with respect to the third isolating insulation film. The dependent claims being further limiting and definite are also allowable.

Claim 8 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record does not disclose, make obvious, or otherwise suggest the structure of the applicant's together with the other limitations of the independent claims, in particular a channel width of the first channel region corresponding to length of a portion of the first electrode portion

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traversing the surface of the first impurity region being set shorter than channel width of the second channel region corresponding to length of the second electrode portion traversing the surface of the first impurity region; in the second impurity region, a portion is provided of which width along a direction of extension of the first electrode portion and the second electrode portion in the second impurity region changes steeply from a portion positioned on the side of the first channel region to a portion positioned on the side of the second channel region; and the second electrode portion being formed to cover the steeply changing portion.

The dependent claims being further limiting and definite are also allowable.

Claim 9 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record does not disclose, make obvious, or otherwise suggest the structure of the applicant's together with the other limitations of the independent claims, in particular a third impurity region of a second conductivity type, electrically connected to the second impurity region and formed at a portion of the first impurity region in a direction away from the isolating insulation film; and in the second impurity region, a portion is formed of which width along a direction approximately orthogonal to a direction from the electrode portion to the third impurity region made narrower, from the side of the electrode to the side of the third impurity region.

The dependent claims being further limiting and definite are also allowable.

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Claims 5, 8 and 10-12 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

In regard to claims 5, 8 and 10-12, the reasons for the indication of allowable subject matter is set forth as mentioned above.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Cereda et al. (5,663,080)

Gill (5,354,703)

Guterman et al. (4,317,273)

Juengling (US 6,777,297)

Kojima et al. (US 2001/0009288 A1)

Maari (5,545,907)

McElroy et al. (5,469,383)

Templeton et al. (US 6,365,945 B1).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ida M Soward whose telephone number is 571-272-1845. The examiner can normally be reached on Monday - Thursday, 6:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

IMS

December 11, 2004

John M. Seward
A.U. 2822